constant. These are even more valuable than absolutely accurate observations that are not homogeneous, because the constant errors do not affect the variations. Accordingly I have for many years urged in the *Meteorologische Zeitschrift* that we should endeavour to continue the homogeneous series of means and extremes of the meteorological elements for as many years as possible, and should collect and critically discuss the older series of observations.

Considered from this point of view, the continuation of meteorological observations on mountains is of special value and most urgently to be recommended. They give us information about the condition of the atmosphere in the higher regions which are less exposed to local influences.

Among the results of recent researches, no other has made so great an impression on me as the observations of the British Antarctic Expedition on the retrograde motion of the glaciers now going on in those regions. The renowned great ice-barrier of James Ross has receded thirty miles; the glaciers of Victoria Land are in full retreat, and no longer reach the sea; while, on the other hand, the Arctic glaciers are receding, and travellers report the same thing about the glaciers of the snow-covered mountains of Ecuador and East Africa.

Comparing these facts with reports and observations of the progressive desiccation of Africa and Central Asia, we are confronted with one of the greatest problems of terrestrial physics. This appears the more difficult of solution since we have similar phenomena on a smaller scale which we can closely observe, both as regards geographical and time distribution, but are unable to explain from a meteorological point of view. I refer to the continual retrograde motion of the glaciers of the Alps, which you have the opportunity of seeing in the vicinity of the place of our present meeting. Although this phenomenon is proceeding in a district where one may suppose sufficient meteorological observations, both as to time and geographical distribution, are available, we are still unable to determine with certainty a direct connection between the variations or periods of the meteorological elements and the movements of the glaciers.

Great results are not attained suddenly, but only after long and carefully prepared efforts. You have met here, gentlemen, to deliberate upon the means by which we may solve, step by step, the most important meteorological problems of the present day.

Dr. Pernter proposed that a certain number of questions should be referred to special subcommittees which would present reports, with the view of simplifying discussions at the general meetings. Subcommittees were nominated for the consideration of (1) an international code and comparison of the standard barometers of different countries; (2) new edition of the cloud atlas, and the classification of clouds; (3) reduction of the barometer to sea-level, and questions relating to weather-telegraphy; (4) international study of squalls.

A vote of thanks was accorded to Dr. Hildebrandsson for his services as secretary to the International Meteorological Committee, and a telegram was dispatched to M. Mascart, president of the committee, expressing regret at his absence owing to ill-health.

An account of the subsequent meetings of the committee will appear in another issue of NATURE.

SCIENCE TEACHING IN ELEMENTARY SCHOOLS.

THE issue by the Board of Education of the Blue-book[1] that lies before us is a promising sign. Intended as a supplement to the necessarily somewhat rigid and mechanical "Code," it indicates the progress which rational ideas upon elementary education have made in the national councils since the days when Robert Lowe's scheme of "payment by results" could claim rank as a piece of wise statesmanship. The opening words of the "Prefatory Memorandum" show the cautious and reasonable spirit in which these suggestions are made:—

"In issuing this volume the Board of Education desire at the outset strongly to emphasise its tentative character, and to invite well-considered criticism designed to make it more useful for its special purpose."

The Blue-book contains an introduction on the objects of elementary schools, organisation, the curriculum, and the methods applicable to children of different ages, followed by chapters on the teaching of particular subjects, viz. English, arithmetic, observation-lessons and nature-study, geography, history, drawing, singing, physical training, needlework and housecraft, handicraft and gardening, and hygiene. Specimen schemes for most of these subjects are given as a series of appendices.

The suggestions made for arithmetic are of a wise and practical kind, as a few extracts will show:—

"The instruction in arithmetic should be made as realistic as possible. . . . The use of sets of objects will make it possible from the very beginning to teach the children to add, rather than count by units. . . . Multiplication tables should not be learnt before they have been constructed and understood. . . . Every school should be provided with (*a*) foot-rulers graduated. . . (*b*) cords with feet, yards and metres marked upon them, . . . (*d*) a pair of common scales with the smaller weights . . . (*e*) measures of capacity . . . (*f*) squared paper or tracing cloth. . . . The commercial applications of arithmetic commonly found in text-books could be advantageously replaced by algebra, practical geometry and the mensuration of the simpler solids and surfaces."

The chapter on observation-lessons and nature-study emphasises the importance of training in accurate observation and accurate description. The distinction made between the two terms is that observation-lessons are for children under ten, while nature-study is for older ones. This seems an artificial distinction, apparently involving the thesis that by the tenth year there is nothing left for observation by the pupils in elementary schools except the outdoor world. The movement of late years for nature-study has, in fact, involved a confusion of thought between subject-matter and method; and it has come to pass that on the one hand didactic teaching of elementary botany, provided it is accompanied by practical verification, and on the other almost any sort of heuristic teaching, are equally covered by that vague and comprehensive term. We see some trace of this confusion of thought in the following remarks:—

"The main factor which marks off nature-study from other school subjects should be that in it the instruction proceeds solely from the actual object, and never from description or reading. In practically every other subject, no matter how successfully the teacher makes the scholar look for the information he requires, the child has to take things for granted, and must depend on the good faith of the teacher or of the printed book; in nature-study comes the opportunity of proceeding by another method and teaching from the thing itself. The teacher should then be very jealous not to waste this unique opportunity" (pp. 48–49).

If this be interpreted as an attempt to use nature-study as an heuristic wedge to be driven into densely didactic school traditions, we may approve of its practical purpose; but with the more idealistic tone of the whole book it is inconsistent. The whole of the chapter on arithmetic is saturated with the notion of "teaching from the thing itself." So far from

[1] "Suggestions for the Consideration of Teachers and others concerned in the Work of Public Elementary Schools." Pp. 156. (1905.)

nature-study affording an unique opportunity for heuristic teaching, the very complexity of the problems which its subject-matter presents puts it at a disadvantage as compared with the simpler problems of elementary physics and chemistry.

Again, how can we reconcile the foregoing quotation with the following, which precedes it by a few pages?

"When a dog has been used as the subject of an observation lesson, the children may read, or be told, about the wolf or the fox. This will lead them to compare and contrast, and will aid in stimulating imagination" (p. 46).

Must we say that the dog is part of "nature" while the wolf and fox are not? or that methods bad for children over ten are allowable below that age? or must we simply explain the difference as due to composite authorship, permissible in a book of suggestions (not instructions), coupled with some confusion of mind on the part of one author between method and subject-matter?

The true idea of the relative positions which heuristic and didactic methods should occupy, which to our mind is well illustrated by the above simple case of the dog and the wolf, is clearly expressed in the chapter on geography:—

"In order that the study of geography may be of real educational value it must not be regarded as a process by which certain facts about the earth . . . are committed to memory. It must be rather regarded as the subject, which above all others brings the youngest child as well as the most advanced student into contact with the outside world. . . . It is true that as we advance in the study of geography we have to rely, to a great extent, upon the investigations of others, but in order that they may understand these investigations we must from the very first teach children to work for themselves and to take nothing for granted."

Nevertheless, it is not suggested that early geographical teaching shall be purely heuristic. On the contrary, the value of stories of strange and distant countries is strongly urged. At first these are scarcely differentiated from fairy-tales, but with each succeeding year they become more exact, until they at length pass into definite geographical teaching for which an observational basis has meanwhile been prepared. Here we see a development of the idea of the relation between didactic and heuristic teaching. It is useless and unnecessary to think, even as a remote ideal, of the exclusion of the former; all that is necessary is to prevent it from being more precise in character than is justified by the stage attained in the latter.

History, in spite of authoritative opinion to the contrary, we must regard as a science, but one in which heuristic teaching is out of the question. Like the one side of geographical teaching, it grows out of fairy-tales, and there need be no scruple in telling young children traditional stories that have not survived modern critical research. But we are glad to see that visits to local places of historical interest are recommended, and that in one at least of the schemes suggested in the appendix the syllabus for the highest class includes "first notions on the materials of history and the use of evidence." Unfortunately, very few teachers will have had any opportunity of acquiring the necessary knowledge on this subject. A book treating in a simple manner of the materials of history—and by no means confined to the documentary portion—is much to be desired.

To sum up the ideas we have so far gathered, we venture to think that in some future edition of these "suggestions" the division into subjects will perhaps be largely abandoned, and in its place we shall have a division by methods which will by no means coincide with groups of the present subjects. Even the official time-tables may come to recognise this. On the one hand we shall have heuristic teaching, aiming primarily at training the mind in scientific habits of thought, and incidentally imparting knowledge; on the other hand, didactic teaching to impart knowledge which is wanted but cannot be obtained at first-hand—its scope being carefully adapted to the stage reached in heuristic training. But, alongside of these two methods, there still remain a number of other subjects, which do not fall under either of these heads, since they consist in training or drilling of some description, *e.g.* the use of the mother tongue, singing, handiwork, and health-training. This last, we agree with the writers of the Blue-book, it is not advisable to teach to young children on a physiological basis. Hygienic habits must be learnt before the age at which physiological laws can really be understood, since some knowledge of physics and chemistry is essential to their real understanding; and to attempt to teach them without such a basis is only to give false knowledge, which is only too likely to prevent the acquisition of true knowledge in later years. A. M. D.

A NEW ULTRA-VIOLET MERCURY LAMP.

UNDER the name of "The Uviol Lamp," Dr. O. Schott, of Jena, is introducing a modification of the Cooper Hewitt mercury vapour lamp, which appears likely to prove useful. The illuminating power of these lamps is very high, and the arc is very rich in ultra-violet rays, but the glass envelope hitherto prevented the passage of many of these actinic radiations. Dr. Zchimmer has recently produced at Jena glasses which are pervious to the ultra-violet rays, and Dr. Schott has made the envelope of the new lamp of this material.

The Uviol lamps consist of tubes of this special glass of 8 to 30 millimetres diameter and 20 to 130 centimetres length. Platinum wires are fused into the extremities, terminating in carbon heads. In the glass tube there is a charge of mercury of 50 to 150 grs., according to the size. The lamps of various sizes, with their resistance and choking coils, can be connected with electric mains of 220 or 110 volts.

To start the arc, the lamp is tilted to a sufficient degree to allow of the mercury in the tube passing from one pole to the other. At the moment of contact between the pole and the mercury, part of the latter is disintegrated simultaneously with the formation of a column of light. The carbon and heads to the poles permit the passage of the current in either direction without fusing the platinum poles. To get the best results from a current of 220 volts the lamp tube must be 130 centimetres long, but two or three suitable shorter lamps may be arranged side by side or one behind or over the other.

The spectrum of the Uviol lamp is exceedingly rich in lines. The lamp is particularly suitable for taking photographs and for copying processes by artificial light. Experiments have also been made in testing by its means if certain colours used in dyeing and printing have sufficient power to resist the fading effects of the sun. It will thus prove of value in rapidly settling the question of the fastness of colours, which will in future require days instead of months.

The Uviol lamp is also a germicide, and it appears likely that it will prove of value in the treatment of certain diseases of the skin. It is an irritant, and easily sets up inflammations, particularly of the eyes, so that the greatest care must be taken by operators